SHORT RESUME/ SYNOPSIS OF PH. D TOPIC

Entitled

"STUDIES ON HELMINTH PARASITE SPECTRUM OF EDIBLE FRESHWATER FISH *MASTACEMBELUS ARMATUS*"

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For the Degree of
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ABSTRACT OF PROPOSED WORK PLAN/ PROBLEM

1. Introduction:

Fishes are most numerous vertebrates and important component of ecosystem. Fish constitute a cheap source of food and provide good food component to tide over nutritional need of human being. For the last few decades, fishes have been extensively used as a protein rich diet for human consumption in India and thus, contribute a lot to its economy. It is estimated that about 10 million tons of fish is required annually to meet the present day demand of fish protein in India against an annual production of only 3.5 million tons. Majority of the fishes serve as an intermediate hosts for many helminth parasites, which reduces the food value of the fish. Parasitism plays a central role in fish biology. Among the parasites, that infect freshwater fishes, helminth forms a most diversified group. All species of fish are vulnerable to various parasitic infections depending on fish species and type of stream inhabited. Parasitic diseases reduce fish production as well as their nutritious value by affecting the normal physiology of fish and can result in mass mortalities of fish.

Fish constitute a major component of diet for the people of India. Helminths are an important group of pathogens, which cause infection and diseases of fish both in freshwater and marine environments, their importance being related directly to the fish that may affect the general public health (Hoffman,1967). As much as 30,000 helminth species have been estimated to be parasites of fishes, many of which are known to be serious menace to their hosts. Every parasite living in or on a fish extends some degree of harmful influence on its host (Williams and Jones 1994). Parasitic diseases of fish are very common throughout the world and are of particular importance in the tropics (Schimidt and Roberts 2000).

Mastacembelus armatus is indigenous aquarium fish and also an economically important freshwater food fish native of India. *Mastacembelus armatus* is a species of ray-finned, spiny eels belonging to genus *Mastacembelus* (Scopoli, 1777) of family Mastacembelidae, and is native to riverine fauna of India. The species was named *Mastacembelus armatus* by Lacepede in 1800. It is esteemed as highly proteinaceous food and attributed as tasty and medicinally important fish. *Mastacembelus armatus* is considered to be most delicious fish in Maharashtra.

Mastacembelus armatus (Lacepede, 1800) is a large elongated fish that has a snake-like body without pelvic fins. Their anal and dorsal fins are elongated and are connected to the caudal fin. The dorsal fin is preceded by numerous spines. The back is dark beige in color while the head is silver-beige. The body's color is dull brown and the belly is a lighter shade of brown. The body may also be marked with brown circular patterns. The bodies also have one to three darker longitudinal zigzag lines that connect to form a distinct reticulated pattern that is restricted to the dorsal two-thirds of the body. The eyes have brown stripes running laterally through them. *Mastacembelus armatus* (Lacepede, 1800) can reach up to 36" (91 cm) in its natural habitat but does not usually exceed 20" (51 cm) in captivity. Male and female zigzag eels are only distinguishable when mature. Females are normally plumper than males.

Mortality of fishes occurs due to heavy infestation of helminth parasites. Owing to the increasing importance of fish as rich source of protein diet worldwide, the present work is proposed, which outlines the species composition of the parasite spectrum occurring in freshwater food fish *Mastacembelus armatus*(Lacepede, 1800) from Nanded District M.S. India including -

- **Morphotaxonomy of Helminth parasites of freshwater fish *Mastacembelus armatus* (Lacepede, 1800) from Nanded District,**
- **Population Dynamics of Helminths of freshwater fish *Mastacembelus armatus* (Lacepede, 1800) from Nanded District,**
- **Biochemical Profile (Glycogen, Protein and Lipid contents) of Helminths and its host tissue of freshwater fish *Mastacembelus armatus* (Lacepede, 1800) from Nanded District.**

2. Review of Literature and Development in the subject (Previous work done in the relevant area**):**

Studies on helminth parasites of fishes were initiated in early 19^{th} century itself by scientists, but they received momentum in the 20^{th} century. Till date, around 30,000 species of helminth parasites have been recorded from freshwater fishes.

Many researchers have studied different aspects including Taxonomy, diversity, biochemistry, histopathology, ecology and population dynamics of helminths of fishes since last 50 years. There are some pioneer workers in the world. Notable contributions to the biology of fish helminthes field were made by Yamaguti, S. (1934, 1959), Woodland (1923, 1924), Woolcock (1935), Anderson (1976), Wardle, R. A., McLeod, J. A. and Radinovsky, A. (1974) etc. In India, some of helminthologists who made extensive work in this fields are Johri (1959), Moghe (1925), Bhalerao (1932, 1937), Thapar, G.S. (1938), Sood, M.L.(1968) Ramadevi (1973), S.M.Ali (1956), K.Hanumanth Rao (1959), M.Z.Chishti (2004), R.Madhavi (2007), Nama, H.S. (1974), S.P.Gupta (1953), Pandey, K.C.(2007), Tandon V. (2005), H. S.

Singh (1995), Malhotra & Capoor (1980), Shinde, Jadhav & his group (1970, 1980, 1984, 2005 & 2006,2008,2015,2016), etc.

3. Objectives of Research/ Proposed Hypothesis:-

The objectives of the proposed study are as follows:

- To make survey of edible freshwater fish *Mastacembelus armatus* (Lacepede, 1800) from Nanded District for Biosystematics of Helminths.
- To identify Taxonomically Helminth parasites of *Mastacembelus armatus*(Lacepede, 1800).
- To study population dynamics of Helminths of *Mastacembelus armatus* (Lacepede, 1800) for incidence, intensity, density and index of infections.
- To study Biochemical Profile (Glycogen, Protein and Lipid contents) of Helminths and its host tissue of freshwater fish *Mastacembelus armatus* (Lacepede, 1800).

4. Methodology to be adopted:

Freshwater fish *Mastacembelus armatus,* for present investigation will be procured from local fishponds and fish markets of Nanded Region, M.S. India. Identification of fish host will be made with help of classical works of Day (1865,1867, 1869,1875-1878,1879,1889), Jayram,(1981).

Helminths collected from *Mastacembelus armatus* will be identified by -

1. Systema Helminthum Vol.I to III- By Yamaguti, S. (1958,1959, 1961)
2. Handbook of Tapeworm identification –By Gerald D. Schmidt (1934)
3. Helminths, Arthropodes and Protozoa of Domesticated Animals-By Soulsby E.J.L. (1982)
4. Keys to the Cestode Parasites of Vertebrates- By Khalil, Jones and Bray (1994)

- Population Dynamics Will be recorded and calculated according to Margolis et.al., 1982.
- Biochemical contents will be estimated by following standard methods.
  1) Glycogen will be estimated by Kemp et. al., method (1954)
  2) Protein will be estimated by Gornall et. al., method (1949)
  3) Lipid content will be estimated by Folch et.al., method (1957)

Study Area:- Different collection sites of host in Nanded District of Maharashtra State, India.

5. Importance of Study:

The present study will be able to increase understanding about biosystematics, population dynamics and biochemical profile of Helminths of freshwater fish *Mastacembelus armatus*(Lacepede, 1800) in Nanded Region in particular and in other areas in general, which will help to design control strategies for this major parasitic group.

- **International Status-**

Helminth parasitization is one of the major factors responsible for decline of fish fauna worldwide. Due to the global incidence of helminth infections in fishes, their detail study would give proper identification of these infections and help reduce them by designing control measures.

- **National Status-**

In the context of India, parasitic diseases are most common (about 78 %) and are encountered more frequently than microbial diseases. However the degree of severity and losses due to such diseases are highly variable. Various workers in different parts of the country have studied the diversity of helminth fauna in India.

It is expected that a thorough and systematic survey would reveal many hitherto unknown and new parasite species harboring the fish hosts in the region.

- **Significance of the study-**

It will help to know helminth parasites fauna which infect freshwater food fish *Mastacembelus armatus* (Lacepede, 1800). Fish are extensively used as a protein-rich food for human consumption. The present studies incorporate the spectrum, composition and diversity of the parasitic species in freshwater fish *Mastacembelus armatus* (Lacepede, 1800) from Nanded District M.S.India, with a view to identifying the helminth species recovered by morphological criteria based on light microscopy. As the host fish *Mastacembelus armatus* (Lacepede, 1800) is widely consumed, the infections to it lead to deeper impact on food quality, which may create a probable concern for public health.

6. Proposed work Plan/ Formulation and Structure of Study:

Year- Wise Plan of Work and Targets to be Achieved:-

First Year:- Review of Literature, Referencing, Research methodology, visit to various localities of Nanded district for collection of helminthes of Piscean host *Mastacembelus armatus* (Lacepede, 1800). Recording the obtained data for Population dynamics study. Collection and preservation of helminth parasites. To study Biochemical Profile (Glycogen, Protein and Lipid contents) of Helminths and its host tissue of *Mastacembelus armatus*(Lacepede, 1800).

Second Year:- Collection of helminth parasites of *Mastacembelus armatus*(Lacepede, 1800) from different localities of Nanded. Fixation, preservation, dehydration, staining and whole mount preparation of helminth parasites. To record the obtained data for population dynamics study. Data analysis. To study Biochemical Profile for Glycogen, Protein and Lipid contents of Helminths and its host tissue of *Mastacembelus armatus*(Lacepede, 1800).

Third Year:- Collection, preservation, staining, mounting and identification of helminths on the basis of Systema Helminthum by S. Yamaguti. Morpho-taxonomic studies on helminth parasites of *Mastacembelus armatus* (Lacepede, 1800). To record the obtained data for population dynamics study. Data analysis. To study Biochemical Profile for Glycogen, Protein and Lipid contents of Helminths and its host tissue of *Mastacembelus armatus* (Lacepede, 1800).

Fourth Year:- Fine morphological and systematic studies of helminthes of *Mastacembelus armatus* (Lacepede, 1800). Confirmation and finalization of obtained data for Biosystematics studies. Camera Lucida line drawings, morphometery, photomicrography, data analysis, drafting, typing and submission of thesis.

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